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CATALOG OF HELIOS 90° PHOTOMETER EVENTS

Bernard V. Jackson
David F. Webb
Paul L. Hick
Jessica L. Nelson

Boston College
Institute for Space Research
Newton Center, MA 02159

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EDWARD W. CLIVER
Contract Manager

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Bernard V. Jackson*
Jessica L. Nelson*
David F. Webb
Paul L. Hick*

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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The two Helios spacecraft were launched into solar orbits in December 1974 and January 1976. Each spacecraft contained three zodiacal light photometers intended to measure the distribution of dust in the interplanetary medium between the Sun and the Earth. Residual brightness variations were evident after the zodiacal light and stellar contributions had been removed from the photometer data. These variations are now known to have been caused primarily by transient plasma clouds propagating through the inner heliosphere. About 2/3 of these were caused by coronal mass ejections and about 1/4 by corotating structures. We have used specific criteria to select and identify these plasma events in the data from the Helios photometers which pointed at the ecliptic poles. This process is now complete and we are making these data available to the scientific community. This document is a catalog of the Helios 90° photometer events which we have identified. In the following text we describe the pertinent characteristics of the zodiacal light experiment, the methods used to select, identify and classify the 90° events, and the details of the catalog structure. A comprehensive bibliography of all published papers involving analyses of the Helios photometer plasma observations and the zodiacal light calibration is also included.

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Bernard V. Jackson

CASS, University of California at San Diego
La Jolla, CA 92093
E-mail: (D) cass01::bvjcme.

David F. Webb

Institute for Space Research, Boston College
Newton Center, MA 02159
E-mail: (D) afglsc::webb; (I) webb@plh.af.mil.

and

Paul L. Hick and Jessica L. Nelson

CASS, University of California at San Diego
La Jolla, CA 92093
E-mail: (D) cass01::plhcme.

February 1994

Contents

FOREWORD

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We have used specific criteria to select and identify these plasma events in the data from the Helios photometers which pointed at the ecliptic poles. This process is now complete and we are making these data available to the scientific community. This document is a catalog of the Helios 90° photometer events which we have identified. In the following text we describe the pertinent characteristics of the zodiacal light experiment, the methods used to select, identify and classify the 90° events, and the details of the catalog structure. A comprehensive bibliography of all published papers involving analyses of the Helios photometer plasma observations and the zodiacal light calibration is also included.

We encourage the use of this list of events by anyone for research purposes. We request that researchers wishing to use the data contact one of the authors for an explanation of the data, to avoid duplication of effort, and to discuss possible collaboration. We would also appreciate hearing about any errors found in the catalog.

1 INTRODUCTION

The Helios zodiacal light photometers measured brightness variations globally around the spacecraft with varying spatial resolution. *Richter et al.* [1982] first described the use of these data to follow plasma ejections detected by electron scattering out to 90° solar elongation. More recently, Jackson and colleagues [see Bibliography, Section 4] have used the Helios photometer data to study the features of a number of individual mass ejections from the spacecraft. Many of the original studies involved events observed in 1979 and 1980 when they could be directly compared with Earth-orbiting coronagraph images of coronal mass ejections (CMEs) near the Sun. Because the Helios spacecraft orbited the Sun on 6-month orbits from 0.3 to 1 A.U., the photometer experiments viewed heliospheric events from a unique perspective. When combined with Earth-based and/or other spacecraft data, these observations could better determine the three-dimensional structure and mass content of the events.

The most recent studies using the Helios photometer data have involved comprehensive surveys of all electron plasma events detected above a given threshold by both sets of Helios photometers. The Helios-1 photometers pointed south of the ecliptic plane, whereas the Helios-2 photometers pointed north. Helios-1 was launched first in 1974 and its photometer experiment survived the longest, operating from early 1975 into 1985. The Helios-2 experiment operated for nearly four consecutive years from early 1976 to the end of 1979. These experiments returned data on interplanetary CMEs during a long gap in conventional coronagraph observations between Skylab, which ceased operations in January 1974, and SOLWIND which began observations in March 1979. The Helios-2 photometer data are of slightly better quality and were surveyed first. These survey results emphasizing CMEs were presented in two papers by *Webb and Jackson* [1988, 1990]. Later papers have used the CME survey results from the photometers on both spacecraft [*Webb and Jackson*, 1992, 1993; *Webb et al.*, 1993]. Survey results of corotating structures (CRSs) observed from both spacecraft are given by *Jackson* [1991] and *Jackson, Hick and Webb* [1993]. These papers have also included results of comparative studies of the characteristics of the *in situ* solar wind plasma and magnetic field data during the times of the white light events.

Other than interplanetary dust, CMEs and CRSs (some of which are related to coronal streamers), possible sources of interplanetary white light enhancements include shock-related compression regions [*Jackson*, 1986], comets [*Jackson and Benensohn*, 1990], and density enhancements at sector boundaries [*Webb and Jackson*, 1990]. Possible detections of all of these phenomena have now been made using the Helios photometer data. The events listed in this catalog were selected using time-series flux plots obtained only with the 90° photometers, which always pointed at the north (Helios-2) or south (Helios-1) ecliptic poles. Although far more events could be detected in the photometers which viewed closer to the ecliptic plane, this method resulted in a consistent data set of events which passed close to the spacecraft. The lower latitude photometer time-series data were then used to classify the 90° events in terms of their temporal evolution and spatial extent from the Sun. In general, about 80% of the 90° events have been classified as coronal mass ejections and their basic characteristics determined. The reader is referred to the papers by *Webb and*

Jackson [1990] and *Jackson* [1991] for detailed descriptions of the Helios photometer experiments and the methods for selection and classification of the 90° events.

The next Section is divided into the following descriptive parts: (2.1) a summary of the pertinent characteristics of the Helios zodiacal light experiment, (2.2) the methods used to select and identify the 90° events, (2.3) the method used to classify the events, and (2.4) the details of the catalog. Section 4 is a comprehensive bibliography of all published papers involving analyses of the Helios photometer plasma observations and the zodiacal light calibration, and Section 5 is the catalog itself.

2 DESCRIPTION OF CATALOG OF HELIOS 90° PHOTOMETER EVENTS

2.1 Instrument Description

The Helios spacecraft, launched in December 1974 (Helios 1) and January 1976 (Helios 2), each contained three zodiacal light photometers originally intended to measure the distribution of dust in the interplanetary medium between the Sun and the Earth [*Leinert et al.*, 1975, 1981a]. However, these photometers could also be used to measure the variations of brightness produced by large-scale differences in the interplanetary electron content. The three photometers were fixed on the spacecraft and rotated at its 1 s spin period on an axis perpendicular to the plane of the ecliptic; they pointed 16°, 31°, and 90° north or south of the ecliptic plane and had apertures of 1°, 2° and 3°, respectively. Data from the 16° and 31° photometers were binned into 32 longitude sectors at constant ecliptic latitude, relative to the spacecraft, around the sky. Each of the sixteen sectors within 45° of the Sun subtended angles of 5.6° in ecliptic longitude; angles of 11.2° and 22.4° were formed for sectors at more distant longitudes. The photometer data were integrated over 8.6-min periods in turn from each of the three photometers through a set of broad-band ultraviolet, blue, and visual light filters and a set of polarizing filters, with a time interval of about 5.2 hours between the same filter combinations. All of the Helios photometer data are available on both computer tapes and optical disks from the National Space Science Data Center (NSSDC).

The Helios photometry was stable with time over several years, and could be calibrated to about 5% in absolute intensity [*Leinert et al.*, 1981a]. The zodiacal light was found to be constant at this level, and was described quantitatively by *Leinert et al.* [1981b]. Relative comparisons of data over short intervals of time are far more precise. The photometer intensities are calibrated in S10 units, one unit of which corresponds to the intensity of one solar-type star with a magnitude of ten per square degree. The best observations of the background noise indicate that over short intervals of a few days, the photometer observations were typically accurate to better than 1 S10 unit [*Jackson*, 1988].

Residual brightness variations can be studied after the zodiacal light and stellar contributions have been removed from the photometer data. *Richter et al.* [1982] showed that these variations are caused primarily by discrete changes in the inter-

planetary electron density, which they called plasma clouds.

By combining observations from each photometer sector interpolated at a given instant in time, these data have been used to form images of the heliospheric plasma similar to those obtained from Earth-orbiting coronagraphs. Because the Helios spacecraft orbited the Sun, these data have provided a unique stereoscopic view of the inner heliosphere. An image processing system developed at UCSD to access these data constructs images of the interplanetary medium by contouring the residual brightness variation around the spacecraft in terms of columnar density or mass [see *Jackson and Leinert,* 1985 and *Jackson,* 1985 for early summaries of this imaging technique.]

2.2 Selection Criteria and Identification of 90° Events

The past studies of the Helios white light events have utilized data obtained with and keyed to the Helios 1 and 2 90° photometers. It is these events which are listed in this catalog. This method was chosen because of the problem of interpreting confusing or complex phenomena occurring near the ecliptic plane, especially near the maximum epoch of solar activity. In addition, the effects of spacecraft orbital motions are minimized by using views at the ecliptic poles. A limitation of this method is that it tends to select only those transients which enveloped or passed north of the Helios 2 or south of the Helios 1 spacecraft, i.e., those which were aimed in its general direction. With this criterion, events can be missed which passed entirely south of the Helios 2 or north of the Helios 1 spacecraft.

Richter et al. [1982] used time-series plots of the Helios 2 90° photometer data to identify some outstanding interplanetary plasma events which occurred during the spacecraft lifetime. The zodiacal light contribution was removed from these data through use of an appropriate empirical model of its distribution [*Leinert et al.*, 1981b], and were normalized to the expected brightness at 1 A.U. For our final selection of transient events, we produced similar time-series plots for the 90° photometers during the entire experiment lifetimes for each spacecraft. These show the intensity in S10 units plotted as a function of time normalized for distance from the Sun. As stated earlier, the basic time resolution of these data is 5.2 hours.

We established a set of criteria that was used to select significant brightness enhancements from the 90° time-series plots for further study. We excluded brightness enhancements or dropouts consisting of a single data point; most of these were instrumental in nature or due to particle events [see *Webb and Jackson*, 1990]. We selected events which exhibited distinct rise and fall flux profiles consisting of two or more data points. The events had to have peak brightnesses at least 0.5 S10 unit above the background in the time-series data normalized to a distance of 1 A.U. This selection was made using data obtained with the photometers' clear or blue filters. As a final confirmation of the event, we required the data to have a similar profile in the 90° pB (polarized brightness) data that was plotted concurrently with the clear or blue filter plots. Both D. Webb and B. Jackson independently identified the photometer events, then jointly made the final selection.

2.3 Classification of the 90° Events

To classify the transient plasma events observed in the 90° data, the lower latitude photometer time-series data were examined to determine the overall temporal evolution and spatial extent of each event. The star background was removed from the lower latitude photometer time-series data, and then a model fit to the zodiacal light background was subtracted from the data. The resulting data, normalized for distance, were then plotted for time intervals of 8 days centered on the event period in one color for all sectors and filters of that color. The brightnesses of the events were determined by placing a straight baseline across the base of the event interval. If possible, the color of the lower latitude photometer filter sequence used was the same as for the 90° plots. Finally, the unnormalized 90° data were replotted to the same time scale and a straight baseline was used to determine the start, peak and end time, intensity amplitude and duration of each 90° event.

To be classified as a CME an event had to move progressively outward from the Sun. Thus, in the Helios view, it would have to appear first in the photometer viewing 16° ecliptic latitude, then successively later in the 31° and 90° photometers. The preliminary speeds represented by the successive time delays also had to be reasonable (i.e., hours to several days). Typically, mass ejections could be observed in the lower latitude photometers to move outward simultaneously both to the east and west of the Sun prior to reaching the 90° photometer field of view.

CRSs were identified as structures which moved progressively from east to west of the Sun before and after passing through the 90° photometer view. CRSs which passed near the spacecraft moved more rapidly from east to west than did more distant CRSs. Operationally, the distinction between CMEs and CRSs was made by observing on the sector time-series plots of each photometer whether the peak brightness of an event occurred at the same time in each sector (a CME), or at successively later times in more westward sectors (a CRS).

Events with insufficient data in the lower latitude photometers to permit an identification were labeled "Insuff. Data". A few events were not visible in the lower latitude photometers even though there should have been sufficient data to make a determination. These events were listed as "Can't Tell". When the identifications of the 90° events in the lower latitude photometers were not certain enough to clearly classify them as a CME or a CRS even though a transient structure was observed, they were designated as possible ("Poss. CME" or "Poss. CRS"). Possible events were usually those in which two or more events appeared in the lower latitude and/or 90° photometer data and were impossible to disentangle. For other events labeled "possible", the data were only partly available or the time cadence was poor, or for some other reason the 90° event could not be positively identified.

2.4 Description of Catalog

2.4.1 Timing of Events

The catalog is a summary compilation and classification for the 293 events which satisfied the criteria above. The first half of the catalog lists the Helios 1 90° photometer events (1975–1983) and the last half lists those for Helios 2 (1976–1979). The events

are grouped by year and Helios orbit number, and by the chronological event number within that orbit. Boundaries between orbits and years are marked by horizontal lines across the table. The first column gives the number of the event in that orbit observed with the 90° photometer, and the associated data are presented in the 6 groups to the right separated by vertical lines. The first 3 groups present the basic data for each event observed with the 16°, 31° and 90° photometers, respectively.

Each photometer's group gives the start, peak and end times and the peak intensity of the event above the fitted baseline background in that photometer. The times are given in day of year (DOY) and decimal parts of a day. The equivalent calendar dates of the peak times are given in the second row of each event. The brightnesses, ΔI, are in S10 units above the pre-event background. These values are unnormalized for distance from the Sun, but have been corrected for zodiacal light and star background.

Often the baseline was difficult to determine, especially if more than one event was superimposed. The best observed events have peak times determined to an accuracy of about 0.03 days and amplitudes to about 5%. Typical event peak times are accurate to about 0.1 day and amplitudes to about 20%. Start and end times are generally less accurately determined than peak times. The lower latitude photometer start, peak and end times for the CMEs are the times which best match the shape of the event in the 90° photometer. These times represent the data for the CME when it was closest to the Sun, i.e., in sectors 1 and 32. Where possible because of the westward motion of the spacecraft, the start, peak and end times for sector 32 are used for Helios 1 times and the times for sector 1 are used for Helios 2. The same procedure was also used for the CRS events even though these events could be observed at an earlier date in the lower latitude photometers to the east of the Sun prior to their reaching sectors 1 or 32 (and also far longer to the west of these sectors).

A given 90° event might be associated with one or more distinguishable lower latitude photometer events. If there were two events or two classes of events, then two values of each parameter are listed if they could be determined separately (see Section 3 below).

In the last column of the 90° photometer group, the distance of the spacecraft from the Sun in A.U. at the time of the peak event brightness is given. This parameter is useful to know for calibration of the brightnesses, matching the 90° events with those in the lower latitude photometers, determining speeds and associating the photometer events with in-situ plasma and magnetic field parameters.

2.4.2 CME Speeds

Speed is an important parameter of CMEs which can be directly measured on sequences of coronagraph images. Speeds from such images are usually determined by fits to measurements of the leading edge of the CME on height/time plots. The speeds of CMEs determined from the photometer data are based on the difference in times between the peak brightnesses in the different photometers.

The fourth group of data in the catalog gives the values of these speeds for the three pairs of photometer data. The speeds are listed for timings of the material between the set closest to the Sun, 16° to 31°, the pair farthest from the Sun, 31°

to 90°, and the values between the two extremes, the 16° to 90° photometers. Only speeds for this latter pair are available for orbits following mid-1979 when the 31° photometers on both spacecraft failed. For CRSs a single speed is given in the catalog, and was derived by modelling the outward material flow of each event (see below).

The speeds listed for the CMEs were obtained by assuming that the bulk of the material observed by each photometer was moving in a direction perpendicular to the closest approach of the line of sight to the Sun, and that the material moved through the line of sight of the 90° photometer at the spacecraft. This assumes that different parts of the CME were measured, since each perpendicular does not follow along the same radial from the Sun. Speeds could be greater than the speeds listed if the CME was moving radially outward and narrowly directed toward or away from the observer. The most accurate speeds were usually those obtained when the spacecraft was most distant from the Sun, such that the event took longer to move from one photometer to the other and therefore was more accurately measured with the slow instrument cadence. Another method of speed determination was also used by *Webb and Jackson* [1990)] to estimate Helios 2 CME speeds; that method assumed that the CME moved radially out from a known source region at the Sun.

The quality of observation varied from one event to another. Some of the peak times were more uncertain than others and are marked with question marks '?'; the speeds derived from them were therefore also uncertain and are also marked '?'. The last column in the group (Q for Quality) gives our estimate of how well the peak times could be measured and the speeds determined. The letter symbols signify: P = Poor, F = Fair, G = Good, V = Very good and X = Excellent.

2.4.3 CRS Parameters

Events identified as CRSs were modeled as corotating structures and have additional parameters given for them (i.e., *Jackson*, 1991). During the modeling procedure, a few of the 90° events originally designated as "CRSs" were found not to be well fit as modeled corotating structures. The designation of these events was subsequently changed to "Poss. CRS". Though no attempt was made to look at all the original possible CRS events, a few of them were found to fit the modeling procedure and their designations were changed to "CRS". The CRS parameters are given in parenthesis in the row below the 90° photometer times and are respectively: (1) the solar height of the corotating structure centroid when viewed in the 90° photometer; (2) the heliographic latitude of the corotating structure centroid; (3) the Carrington longitude of the corotating structure centroid base; and (4) the outward material speed derived for the corotating structure from its curvature along the Archimedean spiral.

2.4.4 Comments on and Classification of Helios Events

Finally, general comments about the classification process and the classifications themselves appear in the last two columns of the catalog. The comments are mostly self-explanatory. One exception are references to a zodiacal light (Z.L.) "wow", such as for Event 6 at Helios 1 on Orbit 1. This term is used for an abnormally long gradual, low amplitude rise and fall "event" which occasionally appeared on the 90°

photometer time-series plots. These structures tended to reappear at the same ecliptic longitudes on other orbits and, therefore, were probably related to quasi-permanent interplanetary dust blobs not accounted for in the simple, smoothly varying zodiacal light model. *Richter et al.* [1982] considered these structures to be evidence of "a weak ring-like enhancement" of the dust.

In the last column is the classification of the event based on data from all of the photometers as discussed in Section 2.3. Nearly all of the classifiable 90° photometer events were found to be either definite or possible CMEs or CRSs. Exceptions include the observation of Comet West from Helios 2 in March 1976 [*Jackson and Benensohn,* 1990], and particle events such as that at Helios 1 on 21 June 1980.

There were a total of 293 90° photometer events detected from both spacecraft, of which 278 could be classified as due to either or both CMEs or CRSs. In Tables 1 and 2 we tabulate the number of events detected at each spacecraft by year and orbit number and the breakdown by class of the CME, CRS or other classified events. Note that these values are not corrected for the photometers' observation cycles. Such corrections have been applied to get the occurrence rates of the Helios CMEs and CRSs and are discussed in the papers by *Webb and Jackson* [1990, 1992, 1993]; *Jackson et al.* [1993]; *Webb and Howard* [1994]. As an indicator of the duty cycle, we show in the last column of each table the number of days of photometer data coverage on each orbit (an orbit was about 185 days long). At least one definite or possible CME was responsible for the 90° event in 68% (198 of 293) of the cases, and a definite or possible CRS in 27% (80 of 293). There are overlaps between the classes, since a given 90° event could be associated with one or more events of different classes.

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Table 1: Classifications of Helios 1 90° Events by Orbit

Year	Orbit	CME def.	CME pos.	CRS def.	CRS pos.	Insuff Data	Can't Tell	Total Events	Days of Cov.
1975	1	5	0	0	0	2	3	9	143
1975	2	4	2	2	1	1	2	11	176
1976	3	3	3	0	2	2	2	11	168
1976	4	1	3	1	0	0	2	7	130
1977	5	7	0	2	2	0	0	9	185
1977	6	4	1	4	0	2	1	12	138
1978	7	13	4	4	4	0	2	23	132
1978;79	8	6	1	5	1	2	0	13	87
1979	9	8	2	3	0	0	1	14	91
1979	10	8	1	0	0	2	0	11	92
1980	11	13	2	1	0	0	0	16	70
1980;81	12	4	1	4	1	1	0	9	63
1981	13	12	2	2	1	0	0	14	58
1981;82	14	4	0	3	0	0	0	7	55
1982	15	8	3	3	0	0	0	13	49
1983	17	2	0	0	0	0	0	2	22
1984	18	0	0	0	0	0	0	0	5
1984	19	0	0	0	0	0	0	0	4
1985	20	0	0	0	0	0	0	0	10
Totals	16	102	25	34	12	12	13	181	—

In addition to the listed classes, there were 4 events attributed to particle events and 3 to spacecraft glitches.

No photometer data were obtained on Orbit 16 in 1983.

Table 2: Classifications of Helios 2 90° Events by Orbit

Year	Orbit	CME def.	CME pos.	CRS def.	CRS pos.	Insuff Data	Can't Tell	Total Events	Days of Cov.
1976	1	4	2	1	2	0	1	9	178
1976;77	2	0	0	1	0	1	2	4	161
1977	3	4	2	0	1	2	1	10	133
1977;78	4	11	2	3	5	3	3	25	168
1978	5	12	2	8	0	2	0	21	132
1978	6	9	1	1	3	1	0	13	65
1979	7	11	0	5	1	0	0	14	85
1979	8	11	1	2	1	1	1	16	70
Totals	8	62	9	21	13	10	8	112	—
Both Spacecraft	24	164	34	55	25	22	21	293	—

In addition to the listed classes, one event was due to Comet West and one to a spacecraft glitch.

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1975 – Orbit No. 1																		
1	3.9	5.0 Jan. 5	5.3	24.0	4.3	5.7 Jan. 5	6.8	9.0	6.5	7.2 Jan. 7	8.3	1.1	0.92	550	525	530	G	Brightest in East.	CME
2		No event visible.				No event visible.			>40.4	~40.6 Feb. 9	<40.8	3.3	0.67					Not a particle event. Maybe something, but late.	Can't tell
3		Insuff. Data				No event visible.			63.4	~63.9 Mar. 4	64.6	11.0	0.38					Prob. spacecraft reorientation.	Glitch; Can't tell
4	70.4	71.2? Mar. 12	71.8	53.8	71.0	71.4? Mar. 12	72.5	44.0	71.6	72.1 Mar. 13	73.0	1.2	0.31	570?	375?	420?	F	Mostly west. Peaks later in 16°.	CME
5	72.2	73.0 Mar. 14	74.3	125.0	72.5	73.5 Mar. 14	74.3	92.4	73.3	74.2 Mar. 15	75.0	1.9	0.31	235	395	325	G	Mostly west.	CME
6		No event visible.				No event visible.			75.7	78.5 Mar. 19	80.6	11.1	0.32					Prob. Z.L. wow. Repeats on other orbits.	Can't tell
7	89.5	90.0	91.3	78.4	89.8	90.4	91.5	30.8	91.0	91.5	92.8	13.5	0.47	425	385	395	G	Likely two CMEs. Earlier CME brighter in 16°. A corotating feature may be present too.	CME (2)
	~91.3	90.9 Mar. 31	92.4	89.6	(Glitch this peak)					92.1 Apr. 2			0.47	–	–	480	G		

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1975 – Orbit No. 1																		
8	Insuff. Data				Insuff. Data				>156.0	~157.4 Jun. 6	<159.8	0.6	0.97					31° insuff. data. More data in 16° but still not enough.	Insuff. Data
9	Insuff. Data				Insuff. Data				163.9	~164.7	166.8	1.5	0.98					Double peak in 90° data. Insuff. data in 16° and 31°.	Insuff. Data
										~165.6 Jun. 14		1.3	0.98						
	1975 – Orbit No. 2																		
1	No event visible.				No event visible.				216.7	217.0 Aug. 5	218.0	5.9	0.80					Glitch at 90°	Glitch
2	Insuff. Data				Insuff. Data				>241.7	~244.6 Sep. 1	<246.0	≥2.6	0.50					Insuff. data in 16° and 31°.	Insuff. Data
3	252.4	253.4 Sep. 10	254.5	119.0	252.8	253.7 Sep. 10	254.5	45.0	253.3	254.1 Sep. 11	254.5	13.6	0.38	450	770	625	V		CME
4	260.0	260.5 Sep. 17	260.8	125.0	~260.2	260.6 Sep. 17	261.2	~44.0	260.2 (0.318)	261.7 (-6.9)	262.0 (358.5)	4.5 (272)	0.32					3 structures in 90°. (4 CRS latitudes measured)	2 CRSs
	259.3	259.8 Sep. 16	260.1	125.0	259.5	260.5 Sep. 17	~261.0	~20.0	260.2 (0.323)	261.0 (-9.9)	261.5 (359.9)	5.9 (293)	0.32						

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1975 - Orbit No. 2																		
5	268.8	269.5 Sep. 26	270.2	264.0	269.3	270.0 Sep. 27	270.6	66.0	270.2	270.7 Sep. 27	>271.1	11.9	0.34	280	430	365	V	Both this and and a later CME lie atop a CRS. Star in 16°.	CME
6	270.2	270.6? Sep. 27	271.9	110.0	270.6	271.6 Sep. 28	272.4	77.0	271.3	272.6 Sep. 29	273.5	5.1	0.36	155?	290	225?	F	Follows above event. A CRS rotates by later.	CME
7	281.5	283.5 (Mostly west)	284.0	84.0	281.9	283.9 (Mostly west)	284.5	23.8	282.5	284.6 Oct. 11	284.8	5.6	0.50	560	655	620	G	CME may be atop a CRS.	CME; Poss. CRS
8	302.5	303.3 Oct. 30	305.0	54.0	301.6	303.8 (Mostly west)	305.4	18.0	303.2	304.8 Oct. 31	306.3	1.1	0.74					confused with poss. Z.L. mound.	Poss. CME
9	Insuff. Data				Insuff. Data				>311.9	313.5 Nov. 9	>314.1	1.2	0.81					Not obs. in 16° and 31°.	Can't tell
10	Insuff. Data				Insuff. Data				>314.1	314.7 Nov. 10	315.0	5.5	0.82					Not obs. in 16° and 31°.	Can't tell
11	355.9	356.2 Dec. 22	356.7	16.0	356.1	356.3 Dec. 22	356.5	5.7	356.6	357.0 Dec. 23	357.2	1.7	0.98					16° and 31° photom. data has big wow.	Poss. CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1976 – Orbit No. 3																		
1	Insuff. Data				Insuff. Data				365.6	1.9 Jan. 1	3.6	0.9	0.98					Poor lower photom. data.	Can't tell.
2	Insuff. Data				Insuff. Data				>6.4	8.6	10.0	0.9	0.97					Double peak in 90°. Nothing in 16° and 31°.	Can't tell
										9.7 Jan. 9		1.0	0.97						
3	44.4	45.0 Feb. 14	45.6	10.0	44.7	45.4 Feb. 14	45.9	3.0	44.3	45.9 Feb. 14	46.6	1.0	0.77					Hard to tell, event at 90°.	Poss. CME
4	79.7	80.3? Mar. 20	81.7	88.0	80.2 (Mostly west)	80.6?	81.8	39.6	80.5	81.0 Mar. 21	82.3	5.6	0.36	535?	650?	610?	F		CME
5	>81.6	82.8 Mar. 22	<83.2	396.0	>82.2	~83.3 Mar. 23	<84.2	26.4	<82.3	~83.1 Mar. 23	<84.0	≥12.5	0.34					Maybe particle event, but could be CME with it.	Poss. CME; Prob. part. event
6	108.8	110.0	110.7	38.4	109.2	110.2	111.0	14.4	109.8	110.7	111.4	2.5	0.52	1520	865	1005	F	CME on a CRS?	CME;
		110.0 Apr. 19		38.4		110.5 Apr. 19		14.4		111.0 Apr. 20			0.52	460	890	680	G		Poss. CRS
7	111.2	111.2 Apr. 20	112.3	67.2	111.3	112.1 Apr. 21	112.5	21.6	112.3	112.9 Apr. 21	113.5	2.5	0.55	270	575	420	G		CME
8	126.4	126.9 May 5	130.5	108.0	125.1	127.2 May 6	128.8	14.0	>126.8	128.3 May 7	129.4	1.7	0.72					Glitch in all photoms. dominates nearly all data.	Poss. CRS

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1976 – Orbit No. 3																		
9	Insuff. Data				<149.5	~151.4 May 30	152.4	15.0	152.0	152.9 May 31	153.4	0.8	0.90					Not present in 16°. Too sparse in 31° for most of 90° event.	Poss. CME
10	Insuff. Data				Insuff. Data				159.0	159.8 (Data gap)	161.3	>0.6	0.94					Poor observations in 16° or 31°. (Not a CRS.)	Insuff. data
11	Insuff. Data				Insuff. Data				161.3	162.0 Jun. 10	162.6	0.5	0.94					Poor observations in 16° or 31°. (Not a CRS.)	Insuff. data
	1976 – Orbit No. 4																		
1	275.5	276.6 Oct. 2	278.0	176.0	275.9	276.8 Oct. 2	278.5	77.0	276.5	277.2 Oct. 3	278.6	8.9	0.32	520	710	635	G		CME
2	282.0	283.2 Oct. 9	284.0	132.0	<283.0	283.2 Oct. 9	284.0	44.0	283.3	283.7 Oct. 9	284.0	5.5	0.32						Poss. CME
3	315.8	317.5 Nov. 12	319.5	36.0	317.5	319.5 Nov. 14	321.6	16.2	319.2 (0.882)	321.0 (-26.9)	322.2 (279.4)	1.8 (329)	0.74						CRS
4	326.2	328.6 Nov. 23	330.5	24.0	327.2	328.3 Nov. 23	330.2	10.5	328.0	≃329.5 Nov. 24	330.5	0.8	0.82						Poss. CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1976 – Orbit No. 4																		
5	330.9	332.2 Nov. 27	332.8	16.0	331.2	332.1 Nov. 27	333.2	5.6	332.3	333.2 Nov. 28	334.4	1.0	0.84						Poss. CME
6	Insuff. Data				Insuff. Data				344.2	345.2 Dec. 10	346.0	1.4	0.91						Can't tell
7	Insuff. Data				Insuff. Data				363.2	364.8 Dec. 29	365.6	1.0	0.98						Can't tell
	1977 – Orbit No. 5																		
1	32.5 (Difficult to see)	33.9	35.0	≃24.0	33.0	34.4 Feb. 3	35.3	6.0	34.5	35.5 Feb. 4	36.1	1.3	0.93	770	740	750	G		CME
2	63.8	64.2 Mar. 5	65.0	20.0	64.0	64.6? Mar. 5	65.5	16.0	64.8	65.5 Mar. 6	66.1	1.2	0.72	665?	675?	670	F		CME
3	75.5	77.2 Mar. 18	78.5	43.2	76.0	77.7 Mar. 18	79.0	11.0	77.0	78.6 Mar. 19	79.1	1.9	0.57	545	485	500	F	Plot poor but CRS poss. in 31° photom. sectors 2-30	CME; Poss. CRS
4	78.8	79.5 Mar. 20	80.5	48.0	79.0	79.7 Mar. 20	81.0	18.0	79.4	80.6 Mar. 21	81.3	4.4	0.55	1045	555	660	V		CME
5	93.5 (Difficult to see)	94.9	95.5	144.0	94.1	95.0 Apr. 5	96.0	50.4	94.0	95.3 Apr. 5	96.0	6.2	0.36	1155	1255	1220	G		CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1977 - Orbit No. 5																		
6	103.0	104.1	105.0	110.0	103.2	104.3	105.2	44.0	103.2	104.8	105.5	20.3	0.31	560	605	590	G	Same event as 7(?).	CME
	(Hard to tell. Big increase at same time.)					Apr. 14				Apr. 14									
7	102.2	103.4	104.2	88.0	<103.2	104.9	105.7	132.0	<103.4	105.4	106.1	9.1	0.31					Same event as 6(?). CRS dominates.	CRS
	(Confused with CME)					Apr. 14			(0.362)	(-29.0)	(159.6)	(273)							
8	121.3	122.9	124.0	140.0	121.5	123.1	124.3	42.0	123.1	125.2	126.1	3.8	0.52						CRS
		May 2				May 3			(0.602)	(-25.0)	(341.2)	(372)							
9	157.5	158.3	159.0	14.0	158.0	158.8	159.8	7.0	159.0	159.8	160.7	1.5	0.86	770	750	755	G		CME; Poss. CRS
	(No evidence of CRS)				(Goes west)					Jun. 8									
	1977 - Orbit No. 6																		
1	Insuff. Data				Insuff. Data				223.8	225.1	226.8	0.4	0.93					Lower photom. data begins at event onset.	Insuff. data
										Aug. 13									
2	237.8	238.8	240.0	28.0	238.4	239.4	240.5	11.2	239.8	240.7	242.0	1.5	0.84	540	530	535	V		CME
		Aug. 26				Aug. 27				Aug. 28									
3	251.0	251.3	252.5	90.0	Insuff. Data				250.7	251.5	252.3	2.2	0.76						Glitch
	(Data glitch)									Sep. 8									

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1977 – Orbit No. 6																		
4	251.8	252.7	253.8	21.6	252.0	253.2	254.0	3.6	253.0	254.3	255.8	1.5	0.73						CRS; Poss. CME
	(Data glitch)				253.0	253.7	254.2	5.4	(0.753)	(-19.0)	(84.2)	(314)							
					Sep. 10														
5	270.0	271.0	271.5	105.3	270.5	271.4	272.5	36.0	271.5	272.1?	272.6	4.3	0.53	480	720?	615?	F	90° data sparse.	CME
		Sep. 28				Sep. 28				Sep. 29									
6	Insuff. Data				Insuff. Data				284.0	285.4	287.5	8.3	0.36					Lower photom. data too sparse.	Can't tell
										Oct. 12									
7	322.6	323.5	324.6	40.0	322.4	324.1	325.5	12.0	324.2	325.4	326.0	2.3	0.64					Data glitch at begining and at end of event time makes analysis difficult.	CRS
	(Data glitch makes analysis difficult.)					Nov. 20			(0.692)	(-12.1)	(38.4)	(355)							
8	331.3	332.4	333.5	32.0	331.3	333.4	333.7	8.0	334.0	334.7	335.8	1.5	0.74	295	510	410	G		CME
		Nov. 28			(Data glitch)					Nov. 30									
9	Insuff. Data				Insuff. Data				<335.2	335.5	336.0	1.3	0.75					Probably part of event No. 8.	Insuff. data
										Dec. 1									
10	338.6	340.0	341.5	39.2	338.8	340.4	341.5	14.0	341.0	341.4	342.3	2.7	0.80						CRS
		Dec. 6				Dec. 6			(0.811)	(-6.0)	(212.4)	(299)							
11	346.3	347.6	348.5	28.0	347.0	348.0	349.2	14.0	348.8	350.4	350.8	1.4	0.86						CRS
		Dec. 13				Dec. 14			(0.899)	(-11.9)	(113.9)	(279)							
12	353.4	354.4	355.8	24.0	354.3	355.6	356.6	9.0	355.6	357.0	358.6	0.6	0.90	305	555	435	G		CME
		Dec. 20				Dec. 21				Dec. 23									

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1978 - Orbit No. 7																		
1	Insuff. Data				Insuff. Data				58.4	59.0 Feb. 28	60.0	0.2	0.89					May be part of event No. 2.	Can't tell
2	59.0	59.7 Feb. 28	60.4	42.0	59.3	60.0 Mar. 1	61.0	8.4	60.3	60.9 Mar. 1	61.7	0.4	0.88	1040	860	910	V		CME
3	Insuff. Data				Insuff. Data						62.4	0.3	-					May be part of of event No. 2.	Can't tell
4	62.3	63.8	65.0	32.2	63.7	64.6	65.8	3.5	65.0	66.9	67.5	1.5	0.84	390	305	330	V	CRS peak at ~65.0 probably not part of later CME.	CME; CRS
	62.6	63.7 Mar. 4	64.6	25.2	63.3	64.4 Mar. 5	65.7	8.4	66.0 (0.947)	66.8 (-30.0)	67.5 (89.3)	<1.7 (305)	0.84						
5	74.5	76.5 Mar. 17	79.0	45.0	74.5	76.8 Mar. 17	78.8	16.2	76.5 (0.809)	78.9 (-27.7)	80.0 (282.2)	1.0 (305)	0.74					90° range could extend from 76.3 to 81.0. Amplitude for this range should be 2.1.	CRS
6	86.9	88.1 Mar. 29	89.0	56.0	86.8	88.4 Mar. 29	89.9	20.0	89.0 (0.654)	89.9 (-25.0)	91.1 (127.7)	2.1 (336)	0.62					Good event	CRS
7	90.0	90.5 Mar. 31	91.1	150.0	90.5	91.0 Apr. 1	91.5	30.0	91.2	91.8 Apr. 1	92.4	2.6	0.60	530	615	585	X		CME
8	91.1	92.0 Apr. 2	92.8	84.0	91.5	92.6 Apr. 2	93.4	23.0	92.5	93.5 Apr. 3	94.1	1.9	0.58	430	525	490	V		CME
9	98.1 (Difficult to tell. Glitch from 98.1 to 98.4.)	98.6?	99.5	83.6	98.5 (CME 6, 7 and 8 not this.)	99.0	100.0	23.8	99.0	99.6 Apr. 9	100.5	5.6	0.50	505?	645	590?	G		CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1978 – Orbit No. 7																		
10	106.0	107.0 Apr. 17	108.0	891.2	106.4	107.3 Apr. 17	108.0	216.0	106.9?	107.7? Apr. 17	108.0	>9.7	0.40	530	840?	705?	G		CME
11	Data glitch				Data glitch				122.0	123.0 May 3	124.7	64.2	0.32						Glitch; Poss. CRS
12	127.0	127.4 May 7	128.0	331.1	127.0	127.7 May 7	128.3	88.0	127.5	128.1 May 8	129.0	≃6.5	0.36	625	720	685	V		CME
13	129.8 128.2	130.2 ~130.2 May 10	130.6 132.5	641.9 ~641.9	130.1 128.3	130.5 130.6 May 10	131.2 132.5	108.0 108.0	130.4	131.0 May 11	131.7	14.1	0.40	530	805	690	V	Whole region dominated by a CRS.	CME
14	130.8	131.7 May 11	132.2	528.6	131.2	132.0? May 12	132.5	180.0	131.9 130.0 (0.445)	132.3 132.1 (-15.0)	133.0 133.5 (70.3)	5.8 9.9 (282)	0.41 0.41	610?	1035?	845	G	Whole region dominated by a CRS.	CME; CRS
									(See event 13 for lower photoms.)										
15	132.2	132.7 May 12	133.4	367.6	<132.4	132.9 May 12	133.8	63.0	132.7	133.2 May 13	134.0	8.8	0.42						Poss. CME
16	133.2	133.9 May 13	134.5	161.5	133.5	134.2 May 14	134.9	42.0	134.2	134.7 May 14	135.4	6.8	0.44	630	715	685	V		CME
17	137.3 136.2	137.9 137.1 (Evidence of CRS in sectors 3-9)	138.8 >137.8	196.0 140.0	137.8	138.4 (No evidence of CRS.)	139.1	67.2	138.4	139.2 May 19	139.7	5.1	0.50	425	500	470	X		CME; Poss. CRS

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1978 – Orbit No. 7																		
18	139.0	139.4	>140.0	56.0	<139.2	139.8	>140.5	<14.0	139.8	140.4	140.7	4.5	0.52					Evidence from lower photoms. poor.	Poss. CME
	(CME(?) is more evident in 16°.)					May 19				May 20									
19	140.4	141.4	>143.0	112.0	<140.8	141.3	142.0	21.0	140.9	141.4	141.9	1.8	0.53						Poss. CME
		May 21				May 21				May 21									
20	161.5	162.6	163.5	84.0	162.0	163.1	164.4	21.0	163.1	164.5	165.3	3.9	0.78	680	470	525	V	16° and 31° data has a glitch at 162.4 that makes analysis difficult.	CME
		Jun. 11				Jun. 12				Jun. 13									
21	166.4	167.2	167.7	42.0	167.3	167.7	168.4	8.0	168.5	169.6	171.6	1.1	0.82						Poss. CME
		Jun. 16			(Big wow in data makes analysis difficult.)					Jun. 16									
22	174.0	176.1	178.1	28.0	173.4	174.8	>176.5	6.0	<174.8	175.8	176.5	0.4	0.86						Poss. CRS
		Jun. 25				Jun. 23				Jun. 24									
23	176.5	177.7?	178.5	16.8	177.0	178.1?	178.5	7.2	178.2	179.0	179.9	0.9	0.88	890?	880?	880?	F		CME; Poss. CRS
	(See event No. 22)					Jun. 27				Jun. 28									
	1978 – Orbit No. 8																		
1	289.5	291.1	291.8	252.0	290.0	291.5?	292.2	49.0	290.6	292.1	293.1	13.5	0.47	445?	655?	565	G		CME
		Oct. 18				Oct. 18				Oct. 19									

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1978 – Orbit No. 8																		
2	>299.3	~302.1 Oct. 29	<303.4	264.0	Data too sparse to see event.				>301.0	≃303.3 Oct. 30	<305.8	9.2	0.34					16° and 31° photom. data too sparse to classify event.	Insuff. data
3	Insuff. Data				Insuff. Data				305.7	306.7 Nov. 2	307.0	23.5	0.32					Lower photom. data absent; no blue light data.	Insuff. data
4	308.6	309.0 (Goes east)	>309.3	234.6	308.6	309.3 (Brighter east)	309.7	22.0	308.5	309.0 Nov. 5	309.8	10.3	0.31					Precursor to much larger event 3 days later.	Poss. CME
5	309.5	311.2 Nov. 7	312.3	440.0	309.0	310.8 Nov. 6	314.2	176.0	310.2 (0.323)	311.6 (-11.4)	314.0 (333.3)	14.9 (308)	0.31					Corotating structure begins with a CME.	CRS
6	314.0 312.0	314.4 313.3 (Data glitch >315.5)	315.0 314.1	440.0 396.0	314.0 312.7	314.6 313.7 Nov. 9	315.1 314.2	55.0 44.0	314.3	314.9 Nov. 10	315.4	7.6	0.33	1055	725	805	G		CME; Poss. CRS
7	333.5	334.6 332.6 Nov. 28	335.1	48.0	333.8	334.6 332.9 Nov. 28	335.3	12.0	334.2	334.9 Nov. 30	335.6	1.8	0.57	– 790	1385 250	2060 320	F F	PB measured brightness at 90°.	CME
8	336.0	337.7 Dec. 3	339.8	190.0	336.5	338.3 Dec. 4	340.2	40.0	338.6 (0.796) 338.6 (0.646)	339.5 (-29.8) 340.7 (-6.9)	341.1 (56.5) 341.1 (73.1)	5.8 (393) ~3.2 (246)	0.63 0.64					Beautiful CRS (Two CRS latitudes measured.)	CRS

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1978 – Orbit No. 8																		
9	343.2	345.1 Dec. 11	>345.8	72.0	343.4	345.5 Dec. 11	347.5	18.0	334.9 (0.880)	347.8 (-29.9)	348.3 (340.7)	3.2 (290)	0.72					CRS dominates	CRS;
	345.0	346.2 Dec. 12	346.8	54.0	345.3	346.6? Dec. 12	346.5	9.0	346.4	347.3 Dec. 13	347.9	3.8	0.71	775?	885?	845	G		CME
10	351.7	353.2 Dec. 19	355.3	70.0	352.0	353.4 Dec. 19	355.9	19.2	354.3 (0.837)	355.7 (-15.0)	357.8 (236.7)	1.1 (283)	0.79						CRS
	1979 – Orbit No. 8																		
11	363.9	364.4 Dec. 30	365.3	42.0	364.0	365.2 Dec. 31	365.9	7.0	1.0	1.9 Jan. 1	2.3	2.7	0.87	440	445	440	G	Some corotation present.	CME
12	365.3	1.1 Jan. 1	1.8	56.0	365.9	1.6 Jan. 1	2.2	10.5	2.3	3.0 Jan. 3	3.3	2.3	0.88	680	535	575	G	Probably part of event No. 11.	CME
13	3.5	5.4 Jan. 5	7.0	55.5	4.0	6.9 Jan. 6	>8.2	30.8	6.8 (0.923)	8.1 (-8.7)	>8.2 (12.8)	2.5 (294)	0.90						CRS
	NO 31° PHOTOMETER DATA AFTER THIS TIME																		
	1979 – Orbit No. 9																		
1	112.5	114.1 Apr. 24	116.6	140.0					113.8 (0.509)	115.3 (-20.2)	116.0 (12.2)	2.4 (260)	0.50					90° peak probably broader than measurements given at 90°.	CRS

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1979 – Orbit No. 9																		
2a	120.3	122.2 May 2	>123.0	324.0					122.5 (0.390)	124.5 (-20.2)	126.7 (266.4)	14.9 (233)	0.38						CRS
2b	<123.0	123.7 May 3	125.5	324.0					<124.5	125.1 May 5	126.5	9.6	0.37						
3	128.6	129.0 May 9	>130.0	1616.7					128.0	129.5 May 9	130.8	9.3	0.33	–	–	820	F	Two CMEs in 16° photom. Earlier goes east, later west.	CME
4	137.0	138.4 May 18	139.3	900.0					138.4	139.1 May 19	139.8	23.3	0.32	–	–	630	G	16° photom. data shows star.	CME
5	Insuff. Data								139.8	140.2 May 20	141.0	6.8	0.33					Star glitch in data obscures event.	Can't tell
6	141.5	141.8 May 21	142.2	>1067.3					141.5	142.6 May 22	143.5	15.6	0.36	–	–	515	G		CME
7	145.0	146.3 May 26	146.9	1538.3					147.3	147.8 May 27	148.4	5.4	0.42	–	–	360	G	Very narrowly directed CME.	CME
8	146.9	147.4 May 27	148.4	307.7					148.4	148.8 May 28	149.7	12.1	0.43	–	–	390	G	Perhaps part of previous CME.	CME
9	161.0	161.2 Jun. 10	161.8	695.5					162.2	162.9 Jun. 11	163.8	5.5	0.61	–	–	455	V		CME
10	<166.0	167.0 Jun. 16	168.3	144.0					166.5	167.4 Jun. 16	168.3	4.3	0.66						Poss. CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1979 – Orbit No. 9																		
11	169.0	169.3 Jun. 18	169.7	90.0					170.7	171.3 Jun. 20	171.7	2.5	0.70					90° data spikey; lower photom. event precedes 90° by too much.	Poss. CME
12	170.5	171.4? Jun. 20	171.8	36.0					172.5	173.3 Jun. 22	173.8	1.4	0.72	–	–	485?	F		CME
13	171.8	172.9 Jun. 21	173.7	198.0					173.8	174.6 Jun. 23	175.1	2.5	0.73	–	–	540	G		CME
14	173.3 ≃171.0	173.9 174.0 Jun. 23	174.4 176.4	234.0 180.0					175.0 173.2 (0.390)	175.8 176.3 (-15.1)	176.8 177.4 (113.8)	1.5 1.7 (294)	0.74 0.75	–	–	495	G		CME; CRS
15	>192.3	193.2 Jul. 12	<193.5	36.0					<192.1	≃193.1 Jul. 12	193.5	2.6	0.88					Particle event	Part. event
	1979 – Orbit No. 10																		
1	Insuff. Data								290.5	291.0 Oct. 18	292.0	3.1	0.67					Event begins at start of orbit; 16° data shows only glitch.	Insuff. data
2	302.8	304.0 Oct. 31	304.8	140.0					304.7	305.4 Nov. 1	305.7	3.7	0.50	–	–	440	V		CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1979 – Orbit No. 10																		
3	305.1	306.4 Nov. 2	307.2	140.0					306.9	307.5 Nov. 3	308.1	4.9	0.47	–	–	530	V		CME
4	310.2	311.2 Nov. 7	312.0	252.0					311.5	312.3 Nov. 8	312.8	4.3	0.41	–	–	435	G	Goes E.	CME
5	312.0	312.8 Nov. 8	314.0	720.0					313.3	313.8 Nov. 9	314.6	6.0	0.39	–	–	515	G	Double lobed. Lobes to east and west.	CME
6	Insuff. Data								<322.0	322.4 Nov. 16	322.9	16.5	0.31					Photom. data too sparse to classify event; possible CME	Insuff. Data
7	324.5	324.9 Nov. 20	325.3	2517.4					325.0	326.0 Nov. 22	327.0	13.7	0.31	–	–	345	G		CME
8	346.0 347.4	346.6 348.6 Dec. 14	347.4 >360.0	408.0 192.0					347.3 (CRS in 16° photom. not present at this 90° time.)	347.9	349.0	5.0	0.54	–	–	540	V	CME and CRS approx. same amplitude and confused one with another.	CME
9	355.7	356.6 Dec. 22	≃357.3	200.0					357.5	358.0 Dec. 24	358.5	3.0	0.66					Seems to begin too far prior to 90° brightness increase.	Poss. CME
10	358.7	359.2 Dec. 25	360.0	60.0					359.7	360.4 Dec. 26	361.7	4.3	0.69	–	–	720	G	Data glitch at 359.0 obscures event.	CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1979 – Orbit No. 10																		
11	360.9	361.4 Dec. 27	362.0	198.7					362.0	363.3 Dec. 29	364.2	0.8	0.72	–	–	490	G		CME
	1980 – Orbit No. 11																		
1a	130.3	130.6 May 9	131.0	>320.6					131.6	131.7 May 10	132.0	6.3	0.48	–	–	555	G	Corotation of event from sectors 31-35.	CME
1b	131.0	131.6 May 10	132.4	~721.3					132.0	132.8 May 11	133.5	10.2	0.47	–	–	485	V	Corotation of event from sectors 31-35.	CME
2	137.8 137.3	138.6? 138.3 May 17	139.0 140.3	396.0 320.0					138.7 138.8 (0.394)	139.7 140.1 (-18.0)	140.0 141.8 (283.0)	7.9 3.6 (178)	0.38 0.38	–	–	440?	F	CRS and CME superimposed	CME; CRS
3	141.3	142.2 May 21	142.9	~658.8					142.3	142.9 May 21	143.7	5.3	0.35	–	–	575	G		CME
4	142.9	143.2 May 22	144.0	1877.6					143.7	144.0 May 23	145.0	0.6	0.34	–	–	520	V		CME
5	145.3	146.2? May 25	147.0	660.0					146.0	146.7 May 25	147.4	13.6	0.32	–	–	780?	F		CME
6	147.0	147.4 May 26	148.0	660.0					147.4	148.0 May 27	148.0	21.1	0.31	–	–	685	G		CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1980 – Orbit No. 11																		
7	149.8	150.0 May 29	150.9	1336.7					150.1	150.6 May 29	151.1	44.3	0.31	–	–	660	V	Particles present at 150.0 in all sectors.	CME
8	151.5	151.7 May 30	152.5	603.9					152.3	153.0 Jun. 1	153.7	10.5	0.32	–	–	300	G		CME
9	154.4	155.5 Jun. 3	156.0	609.1					155.2	156.0 Jun. 4	156.8	16.3	0.34	–	–	815	G		CME
10	159.0	161.0 Jun. 9	162.0	306.9					161.0	161.8 Jun. 9	163.2	26.4	0.40	–	–	605	G	CME double-peaked in 16° data; earlier peak at 159.9.	CME
11a	170.5	170.9 Jun. 18	171.5	575.6					171.7	171.9 Jun. 19	172.2	4.8	0.53	–	–	450	G		CME
11b	Part of event No. 11.								172.2	172.4 Jun. 20	172.8	7.1	0.54					Part of event No. 11.	
12		173.2 Jun. 21							173.0	173.2 Jun. 21	174.4	23.6	0.55					Event visible in all 16° sectors at 1600 S10.	Part. event
13	172.4	~173.3 (Can't tell)	174.7						174.4	175.1 Jun. 23	175.9	3.6	0.57					Particle event at 173.1 to 173.8 puts glitch in lower photometer.	Poss. CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1980 - Orbit No. 11																		
14	176.4	176.9 Jun. 24	177.2	48.0					176.8	177.4 Jun. 25	178.4	0.2	0.60						Poss. CME
15	178.3	179.5 Jun. 27	180.3	443.0					181.3	182.0 Jun. 30	183.0	2.1	0.65	-	-	330	G		CME
	1980 - Orbit No. 12																		
1	Insuff. Data								314.3	315.3 Nov. 10	316.5	7.6	0.57					Data offset at 314.9 in 16° photom. makes classification impossible.	Insuff. data
2	323.3	324.7 Nov. 19	326.3	466.1					325.2 (0.475)	326.6 (-35.6)	328.0 (127.4)	8.6 (296)	0.42					(2 latitudes meas.) (2nd latitude at a later 90° time.)	CRS
3	351.4	352.4 Dec. 17	353.2	812.8					353.4	354.7 Dec. 19	355.3	4.8	0.43	-	-	240	G	Strange event, looks slow.	CME
4	~354.5	355.5 Dec. 20	~356.6	70.0					357.3	358.0 Dec. 23	359.0	2.9	0.48						Poss. CME
5	357.2	357.9 Dec. 22	359.6	958.3					359.2	361.0 Dec. 26	362.3	3.8	0.51	-	-	215	V		CME; Poss. CRS

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1981 – Orbit No. 12																		
6	364.0	1.0 Jan. 1	1.9	430.5					1.3 (0.678)	2.5 (-20.0)	4.1 (99.0)	2.7 (300)	0.61						CRS
7	6.0	8.0 Jan. 8	10.3	90.0					9.4 (0.717)	9.9 (-9.9)	11.0 (7.4)	1.6 (316)	0.69					(2 latitudes measured.)	CRS
8	9.3 8.5	9.9 9.9 Jan. 9	10.5 12.0	>36.0 350.0					11.8 11.5 (0.801)	12.5 12.6 (-20.9)	13.4 13.2 (346.2)	3.2 2.6 (263)	0.72 0.72	–	–	350	F	Difficult association of 16° photom.	CME; CRS
9	11.5	11.9 Jan. 11	12.5	72.0					13.7	14.0 Jan. 14	14.8	0.6	0.73	–	–	440	G	Difficult association of 16° photom.	CME
	1981 – Orbit No. 13																		
1	144.8	145.6 May 25	146.6	468.7					146.3	146.8 May 26	148.1	10.8	0.47	–	–	480	G		CME
2	Insuff. Data								147.2	147.5 May 27	148.0	6.4	0.46					Part of earlier event.	
3	147.5	148.6 May 28	149.3	504.0					149.4	149.6 May 29	150.0	11.3	0.43	–	–	545	G		CME
4	149.0	149.8 May 29	150.3	1273.8					150.3	150.8 May 30	151.2	11.7	0.42	–	–	495	G		CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1981 – Orbit No. 13																		
5	150.0	150.4 151.0 May 31	151.3	512.7					151.2	151.5 151.5 May 31	152.1	7.6	0.41	– –	– –	455 1110	F F		CME
6	159.4	160.0 Jun. 9	160.8	1330.6					159.9	160.9 Jun. 9	161.6	17.9	0.32	–	–	410	V		CME
7	160.8 (CME or CRS)	162.0?	162.8	212.9					162.0	162.9 Jun. 11	163.8	11.4	0.31	–	–	455?	F		CME; Poss. CRS
8	168.8	169.4 Jun. 18	170.4	2226.8					169.7	170.4 Jun. 19	171.3	31.7	0.34	–	–	390	G		CME
9	170.4	171.1 Jun. 20	172.0	704.0					171.3	171.8 Jun. 20	172.3	6.9	0.35	–	–	660	G		CME
10	173.7	174.5 Jun. 23	>176.0	433.8					173.8	174.9 Jun. 23	176.0	6.5	0.38						Poss. CME
11	176.1 173.8	176.5 174.9 Jun. 23	177.4 ~175.8	1513.4 420.0					177.5 177.3 (0.453)	178.0 178.2 (-20.0)	178.9 >179.3 (97.0)	5.7 ~5.1 (200)	0.42 0.43	–	–	370	G		CME; CRS
12	178.3	178.9? Jun. 27	179.6	197.4					178.9	179.5 Jun. 28	180.4	4.6	0.44	–	–	980?	F		CME
13	185.4	186.1 Jul. 5	>186.3	785.0					187.4	188.2 Jul. 7	189.4	2.9	0.56					CRS is present. See event No. 14.	Poss. CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1981 – Orbit No. 13																		
14	189.0	189.3	190.2	220.0					190.2	191.6	192.4	3.8	0.60	–	–	325	G	Part of the same CRS listed in 13.	CME; CRS
	≃186.0	187.8	>188.9	240.0					190.0	191.5	192.2	3.6	0.60						
		Jul. 6							(0.694)	(-23.9)	(312.3)	(238)							
15	195.3	196.8	197.5	51.5					196.8	197.7	198.4	4.8	0.67	–	–	945	G		CME
		Jul. 15								Jul. 16									
	1981 – Orbit No. 14																		
1	333.0	334.4	335.2	404.7					334.2	335.1	336.0	6.5	0.50	–	–	870	G	Previous CME at 333.2.	CME
		Nov. 30								Dec. 1									
2	335.6	337.5	339.2	252.0					338.0	339.3	340.8	6.7	0.44						CRS
		Dec. 3							(0.499)	(-35.9)	(153.2)	(306)							
3	347.7	348.8	350.0	609.3					348.5	349.6	350.3	12.5	0.33	–	–	515	G	Prior CRS influences.	CME
		Dec. 14								Dec. 15									
4	350.9	351.4	352.4	579.8					351.9	352.6	353.4	5.5	0.31	–	–	315	G	Glitch/CME at 350.9 dominates.	CME
		Dec. 17								Dec. 18									
5	352.5	353.6	354.3	1329.5					353.5	354.2	354.6	11.9	0.31	–	–	775	G		CME
		Dec. 19								Dec. 20									

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1982 – Orbit No. 14																		
6	362.8	364.5 Dec. 29	365.5	640.0					364.8 (0.435)	1.2 (-15.0)	2.2 (271.6)	8.6 (340)	0.40						CRS
7	9.0	10.0 Jan. 11	13.2	250.0					9.6 (0.614)	12.7 (-16.0)	14.0 (163.1)	4.9 (338)	0.55						CRS
	1982 – Orbit No. 15																		
1	>156.0	156.4? Jun. 5	156.9	500.0					155.7	157.1 Jun. 6	157.7	23.5	0.54	–	–	955?	F	Particle event at 157.1 confuses 16° photom. data. Double-peaked.	CME
2	>157.7	158.3 Jun. 7	158.8	301.8					157.7	158.3 Jun. 7	158.8	6.4	0.52					Data glitch and lack of data make classification nearly impossible.	Poss. CME
3		Glitch							159.5	160.1 Jun. 9	160.5	17.9	0.50						Glitch
4	161.3 161.8	162.9 162.1 Jun. 11	164.8 >162.2	552.4 155.5					<163.0 (0.505)	164.0 (-33.4)	>166.0 (344.7)	3.6 (243)	0.45					CRS confuses event.	CRS; Poss. CME
5	<164.3	164.5 Jun. 13	165.0	233.3					165.5	166.4 Jun. 15	167.1	5.3	0.42	–	–	270	G		CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1982 – Orbit No. 15																		
6a	173.0	173.5	174.4	7471.0					175.0	175.6	176.3	32.8	0.32	–	–	190	F	Structure corotates to west. Two events mixed.	CME; CRS
	172.4	174.4 Jun. 23	176.8	898.9					173.9 (0.340)	175.6 (-16.0)	177.9 (238.7)	~20.6 (173)	0.32						
6b	174.4	175.2 Jun. 24	175.5	455.1					176.2	176.6 Jun. 25	177.0	11.7	0.32	–	–	285	F		CME
7	176.8	177.6 Jun. 26	178.0	153.2					177.7	178.2 Jun. 27	178.7	12.5	0.31						Poss. CME
8	178.5	179.0 Jun. 28	179.6	3282.2					178.7	179.9 Jun. 28	180.0	8.0	0.31	–	–	420	G		CME
9	179.3	180.0 Jun. 29	180.6	1812.1					180.0	180.9 Jun. 29	181.7	16.4	0.31	–	–	425	G	CRS present. See event No. 10.	CME
10	181.0	182.3	183.3	2030.6					182.0	183.9	185.0	42.0	0.32	–	–	255	G	Overall region of events 8 – 10 is a CRS.	CME; CRS
	177.5	180.0 Jun. 29	183.5	1777.8					182.5 (0.361)	183.9 (-21.0)	184.8 (160.0)	22.3 (320)	0.32						
11	Particle flux event								194.0	194.3 Jul. 13	195.4	6.2	0.44					All 16° photom. sectors show a 4-day enhancement beginning at 194.0.	Part. event
12	200.2	200.8 Jul. 19	201.7	851.2					201.4	201.9 Jul. 20	202.6	9.9	0.54	–	–	615	G	Small pre-event begins 199.3 in 16° photom.	CME

HELIOS 1 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1983 – Orbit No. 16																		
	NO DATA																		
	1983 – Orbit No. 17																		
1	186.0	187.6 Jul. 6	189.0	154.0					187.6	188.7 Jul. 7	189.8	7.5	0.34	–	–	385	G		CME
2	203.0	203.3 Jul. 22	205.0	250.0					204.9	205.4 Jul. 24	206.0	3.3	0.38	–	–	235	G		CME
	1984 – Orbit No. 18																		
	NO EVENTS																		
	1984 – Orbit No. 19																		
	NO EVENTS																		
	1985 – Orbit No. 20																		
	NO EVENTS																		

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1976 – Orbit No. 1																		
1	Insuff. Data				Insuff. Data				30.5	32.5 Feb. 1	34.0	0.6	0.96					No clear ID. Maybe fast CRS or maybe something tracks W-E (back of Sun?).	Can't tell
2	44.2	44.8 Feb. 13	46.3	17.0	44.2	45.9 Feb. 14	46.5	8.4	46.4	46.8 Feb. 15	47.6	1.1	0.90	365	775	565	F	Small CME. W. only in 16°. Maybe on a CRS.	CME; Poss. CRS
3	Insuff. Data				58.2	58.7 Feb. 27	60.2	25.0	59.0	60.2 Feb. 29	61.0	0.9	0.81	–	435	–	F		CME
4	Insuff. Data				Insuff. Data				66.8	68.7 Mar. 8	71.6	2.7	0.73						Comet West
5	Insuff. Data			18.0	Insuff. Data			7.2	73.4	74.3 Mar. 14	75.0	1.1	0.68						Poss. CRS
6	81.8	83.4 Mar. 23	85.0	34.0	81.5	83.5 Mar. 23	85.4	24.0	81.0	~83.4 Mar. 23	84.9	1.5	0.57					Data gap problems. Appears intermittently in all sect. Bad data or strange event.	Poss. CME
7	89.0	89.6 Mar. 29	91.0	73.0	89.0	90.1 Mar. 30	91.0	20.0	89.5	90.8 Mar. 30	91.5	3.5	0.47	405	550	490	G	E-directed CME.	CME

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1976 – Orbit No. 1																		
8	100.2 97.4	101.0 –	101.5 100.8	185.0 132.0	100.4 98.7	101.2 –	101.7 101.8	53.0 44.0	100.7 100.0	101.6 102.0	102.0 103.3	12.0 4.4	0.33 0.32	650	660	655	X	CRS with a CME over it.	CME; CRS
		Apr. 10				Apr. 10			(0.333)	(13.0)	(332.7)	(282)							
9	~157.0	158.3	<159.4	≥10.0	>157.5	~158.9	>160.0	≥4.0	>158.7	~159.7	160.3	≥0.9	0.84					Limited data making ID difficult.	Poss. CME
		Jun. 6				Jun. 6				Jun. 7									
	1976 – Orbit No. 2																		
1	Insuff. Data				Insuff. Data				>253.3	~256.2	<259.0	2.5	0.72					Limited 90° data. Peak @ ~256.2.	Insuff. Data
										Sep. 12									
2	Insuff. Data			~124.2	305.3	307.1	311.2	54.0	306.4	308.4	311.1	3.1	0.43					Broad CRS seen mostly W. Bad 16° data. Probably zodiacal light.	CRS
						Nov. 2			(0.479)	(35.4)	(68.2)	(318)							
3	Insuff. Data				Insuff. Data				≥330.4	~332.7	>334.4	0.8	0.73					No clear structure in 16° or 31°.	Can't tell
										Nov. 27									
	1977 – Orbit No. 2																		
4	Insuff. Data				Insuff. Data				10.0	11.4	~12.1	0.6	0.98					Nothing very obvious. Maybe fast CRS in 31°, not in 16°.	Can't tell
										Jan. 11									

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1977 – Orbit No. 3																		
1	62.2	62.8	63.4	41.3	63.0	63.8	64.5	3.5	64.2	65.1	66.0	0.8	0.81	320	520	430	G	Strange event; May be bad ID. Difficult to observe in 31°.	CME
		Mar. 3				Mar. 4				Mar. 6									
2	67.3	68.1	69.7	20.8	No data				69.9	71.0	71.6	0.9	0.76					Data glitch in all sectors makes ID difficult.	Poss. CRS
		Mar. 9								Mar. 12									
3	73.9	74.7	76.3	18.0	73.9	75.2	76.3	9.0	75.5	76.0	76.9	1.9	0.72	595	700	660	F	Narrow CME goes W.	CME
		Mar. 15				Mar. 16				Mar. 17									
4		~82.4 (Poor)			84.9	83.0	83.6	14.0	82.7	83.9	85.2	2.0	0.63					Marginal detection in 16° and 31°.	Poss. CME
						Mar. 24				Mar. 24									
5	Insuff. Data				Insuff. Data				Insuff. Data									Nothing obvious in in 16° and 31°.	Can't tell
6	<88.5	89.0	89.6	32.0	88.5	89.4	90.3	13.0	88.6	89.2	90.6	2.4	0.56					Data glitch earlier (between 87.0 and 88.5 all sectors) makes analysis difficult.	Poss. CME
		Mar. 30				Mar. 30				Mar. 30									
7	93.5	94.5?	96.0	90.0	93.5	94.9	96.4	50.0	95.0	95.8	96.5	10.2	0.47	525?	435	460?	G	8-day 90° plot bad. Data gap before with another event?	CME
		Apr. 4				Apr. 4				Apr. 5									
8	106.3	107.4	108.6	159.0	106.3	107.5	109.0	50.0	107.0	107.7	108.4	7.7	0.32	1670	1160	1295	F	90° shows big overall lump as well as tiny event. Big CME goes mostly E.	CME
		107.2				107.5			105.5	107.7	110.0	14.2	0.32	555	1160	850	F		
		Apr. 17				Apr. 17				Apr. 17									

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1977 – Orbit No. 3																		
9	Insuff. Data				Insuff. Data				Insuff. Data									Prob. Z.L. wow. Maybe CME on it.	Insuff. data
10	Insuff. Data				Insuff. Data				Insuff. Data									Data not plotted. Too little data.	Insuff. data
	1977 – Orbit No. 4																		
1	Insuff. Data				Insuff. Data				<208.0	~210.0 Jul. 29	<212.7	~0.7	0.98					Not much data. Not a CRS.	Insuff. data for CME
2	226.2 (CME difficult to see and CRS impossible)	226.9	228.5	12.0	226.5 225.5	227.4? 227.3 Aug. 15	229.1 229.5	<6.4 ≃6.8	228.2 228.2	228.9 228.9 Aug. 16	231.0 230.6	0.8 0.8	0.94 0.94	800?	525?	590	F		CME; Poss. CRS
3	229.5	230.0 Aug. 18	231.0	24.5	230.0	230.8? Aug. 18	232.0	≃2.8	231.4	232.1 Aug. 20	232.6	0.7	0.93	475?	610?	560	F		CME
4	Insuff. Data				Insuff. Data				240.5	242.7 Aug. 30	244.6	0.5	0.87					Double peak at 241.6 and 244.0. Can't tell, data too sparse.	Insuff. data
5	Insuff. Data				253.8	255.8 Sep. 12	257.3	12.5	253.6	<255.9 Sep. 12	256.9	>1.3	0.77					Can't follow well in 16°. Data gap.	Poss. CRS
6	>257.2	–	259.3	≥5.0	>257.3	~258.5 Sep. 15	259.6	>4.2	259.0	259.5 Sep. 16	260.2	1.5	0.74					Big data gaps in 16° and 31°.	Poss. CME

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1977 – Orbit No. 4																		
7				36.0	261.0	262.2 Sep. 19	263.2	4.0	>260.2	261.6 Sep. 18	<262.4	1.4	0.72					Uncertain estimate. Data sparse. Little new information at 16°.	Poss. CRS
8	267.2	267.7 Sep. 24	268.4	107.0	267.2	268.0? Sep. 25	269.0	30.0	268.2	268.7 Sep. 25	269.4	2.3	0.64	860?	815?	830	G		CME
9	Insuff. Data				Insuff. Data				<275.0	~276.0 Oct. 3	~277.0	2.2	0.55					Poor data coverage.	Insuff. data
10	<283.8	284.3 Oct. 11	285.0	196.0			285.0	23.8	<284.2 (0.477)	285.5 (24.8)	~286.2 (64.9)	~7.7 (333)	0.42					31° data missing <284.5.	CRS; Poss. CME
11	289.6	291.1 Oct. 18	292.2	154.0	289.9	291.8 Oct. 18	293.4	52.8	291.4 (0.366)	293.5 (11.8)	295.0 (346.4)	8.9 (282)	0.32						CRS
12	291.0	291.5 292.3 Oct. 19	293.4	88.0	291.0	291.8 292.4? Oct. 19	294.0	<39.6	291.0	292.7 293.4 Oct. 20	294.2	7.8	0.33 0.32	445 855?	320 265?	355 350	G G		CME
13	301.2 302.8	302.8? 304.0 Oct. 31	303.4 >304.7	128.0 96.0	301.9 302.6	303.1? 304.2 Oct. 31	303.4 305.0	30.5 32.0	303.3	303.9 Oct. 30	304.8	5.7	0.31	470?	335?	370?	F	Prior CME goes E. (Prior CME may include the one at 90°.)	CME; Poss. CRS
14	304.8	305.2 Nov. 1	307.0	176.0	304.8	306.2 Nov. 2	307.1	37.4	306.2	306.8 Nov. 2	307.5	15.3	0.34	150	480	275	G		CME

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1977 – Orbit No. 4																		
15	308.2	309.5 Nov. 5	>310.5	216.0	308.6	309.6 Nov. 5	310.9	48.6	310.6 (0.411)	311.8 (21.3)	313.6 (221.5)	10.4 (254)	0.40					Maybe part of event 16. Confused with CME.	CRS
16	310.0 (Same, but goes west)	311.2	313.0	396.0	310.5	311.5 Nov. 7	313.2	108.0	310.5	311.9 Nov. 7	313.7	7.1	0.40	505	975	745	G	Maybe part of event 15.	CME
17	Insuff. Data				Insuff. Data				327.4	328.0 Nov. 24	328.7	5.1	0.62					Data glitch, all 3 photoms. 326.2 to 327.3. Not a CRS.	Can't tell
18	327.5	328.8? 328.3 (Hard to see)	329.8	70.0	327.5	328.9 328.6? Nov. 24	330.4	25.0	329.0	329.2 Nov. 25	329.7	1.7	0.63	1865? 840?	1615 940?	1690? 905	F F	Goes E.	CME
19		331.5 Nov. 27				331.5 Nov. 27				331.5 Nov. 27			0.66						Glitch
20	333.0	334.1 Nov. 30	335.0	27.0	333.5	334.5? 334.3? (Goes east)	335.3	7.2	333.7	335.0 Dec. 1	336.0	1.5	0.70	720? 1305?	1075? 810?	925 925	F F		CME
21	Data glitch makes ID bad.				<342.9	343.4 (Earlier glitch makes ID diff.)	345.0	8.0	<343.0	344.2 Dec. 10	346.0	1.8	0.78						Poss. CRS
22		360.3? Dec. 26				360.9? Dec. 26			361.3	362.1 Dec. 28	363.5	1.7	0.91	645?	630?	635?	P		CME

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1978 – Orbit No. 4																		
23	2.2	2.9 Jan. 2	4.3	48.0	3.0	3.6 Jan. 3	5.2	9.0	4.3	4.6 Jan. 4	6.4	0.6	0.94	565	780	690	G	Burlaga et al., '81 event.	CME
24	Insuff. Data				Insuff. Data				>5.0	5.9 Jan. 5	6.6	0.6	0.95					This may be a portion of event 23.	Can't tell
25	Insuff. Data				Insuff. Data				12.0	13.0 Jan. 13	13.4	0.8	0.97					Does not show up in 16° or 31° photoms. Marginal event in pB.	Can't tell
	1978 – Orbit No. 5																		
1			<45.5	–	<45.3	<45.3 Feb. 14	45.5	–	46.0	46.4 Feb. 15	47.3	1.2	0.95					Lower photom. data starts 45.3. Events observed (maybe) after data starts.	Poss. CME
2	59.9 61.0	60.7 61.9 Mar. 2	61.2 63.2	48.0 60.0	60.2	60.7 Can't Tell	61.2	9.0	60.3	61.5 Mar. 2	62.8	1.1	0.88					Both CME and CRS not well measured in lower photoms.	Poss. CME
3	<63.0	64.1 Mar. 5	64.9	21.0	<62.0	63.4 Mar. 4	~65.0	7.0	63.5 (0.900)	64.1 (7.0)	66.3 (185.6)	0.6 (219)	0.87					See 2 for lower photoms.	CRS
4	65.8	66.1 Mar. 7	67.2	21.0	66.0	66.4 Mar. 7	67.5	7.0	66.5	67.3 Mar. 8	68.3	0.9	0.85	1215	750	860	G		CME
5	70.5	71.3 Mar. 12	72.6	56.0	70.5	71.3 Mar. 12	72.6	14.0	71.5 (0.839)	73.9 (9.8)	75.0 (46.6)	0.6 (233)	0.80						CRS

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	16° Time(DOY) peak	16° Time(DOY) end	16° ΔI (S10)	31° Time(DOY) start	31° Time(DOY) peak	31° Time(DOY) end	31° ΔI (S10)	90° Time(DOY) start	90° Time(DOY) peak	90° Time(DOY) end	90° ΔI (S10)	90° Dist. (AU)	Speed 16-31	Speed 31-90	Speed 16-90	Q	Comments	Class
	1978 – Orbit No. 5																		
6	76.5	77.5	78.2	32.4	77.0	78.1?	79.0	7.2	77.9	78.8	79.5	1.8	0.75	495?	910?	710	F		CME;
	74.6	75.7	76.4	26.7	75.7	76.6	77.2	7.2	78.0	78.8	79.4	1.6	0.75						CRS
		Mar. 16				Mar. 17			(0.824)	(16.8)	(318.2)	(299)							
7	81.5	82.5?	83.0	36.0	82.0	82.9?	83.5	9.0	83.0	83.3	84.2	1.2	0.71	735?	1410?	1080?	P	Some evidence of	CME
		82.2?		36.0		82.7?		5.4	(double peak)					575?	985?	795?	P	corotation to E	
		Mar. 23				Mar. 23												prior to position	
																		of CME.	
8	86.2	88.4	90.2	90.0	87.5	89.1	90.5	20.0	88.0	89.8	91.2	3.1	0.64						CRS
		Mar. 29				Mar. 30			(0.736)	(22.9)	(166.2)	(330)							
9	98.0	98.8	99.8	180.0	98.2	99.1	100.2	48.0	98.5	99.7	100.4	10.0	0.51	690	660	670	V		CME
		Apr. 8				Apr. 9				Apr. 9									
10	101.0	102.2	103.0	300.0	102.0	102.6	103.5	72.0	102.5	103.4?	105.0	6.4	0.46	550	505	520	G		CME
		Apr. 12				Apr. 12				Apr. 13									
11	108.0	108.5	109.0	≃264.7	108.2	108.8	109.2	135.0	108.5	109.2	109.7	23.6	0.38	690	670	675	G	Prior CME corotates	CME;
	105.6	106.2	≃107.0	306.0	105.5	106.4	108.0	<72.0		Apr. 19								to arrive at approx.	prior
		Apr. 16				Apr. 16												same time as CME	CME
																		at 90° photom.	
12	109.0	109.3	110.0	276.0	109.2	109.5?	110.5	27.0	109.7	110.0	110.8	8.0	0.37	705?	625?	650	F	Probably part of	CME
		Apr. 19				Apr. 19				Apr. 20								earlier CME.	
13	113.5	114.1	115.5	~660.0	114.0	114.4	116.0	~132.0	114.3	115.0	115.8	17.2	0.32	455	440	445	G		CME
		Apr. 24				Apr. 24				Apr. 25									

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1978 – Orbit No. 5																		
14	<114.5	115.2	>117.0	308.0	>115.0	~115.9	117.2	110.0	115.6	116.2	117.1	14.5	0.30					CRS and CME confused at 90° and in lower photoms.	CRS
	(Confused with CME)				Apr. 25				(0.335)	(24.6)	(217.2)	(255)							
15	118.2	118.8	119.8	308.0	118.5	119.0	119.8	77.0	118.9	119.3	120.3	16.5	0.29	605	815	730	G		CME
	(Goes east)				Apr. 29				Apr. 29										
16	~119.0	120.4	~122.5	>1061.0	<120.0	121.2	123.0	<176.0	120.7	121.8	122.7	12.1	0.29					CRS is dominant.	CRS;
	Apr. 30				May 1				(0.306)	(13.9)	(170.5)	(401)							
	119.8	121.0	121.6	>528.0	120.0	121.2	121.6	>154.0	120.6	121.5	122.6	10.8	0.29	605	795	720	G	CME double-peaked 1st peak goes east.	CME
	May 1				(Goes east)				May 1										
17	121.8	124.7	126.8	748.0	122.0	124.0	127.0	198.0	123.1	124.8	126.9	18.3	0.31						CRS
	May 4				May 4				(0.350)	(34.0)	(154.8)	(377)							
18	135.4	137.3	~140.0	84.0	~134.5	~136.5	~139.3	28.0	135.8	138.1	139.5	3.4	0.48						CRS
	May 17				May 16				(0.484)	(18.9)	(51.2)	(273)							
19	142.5	144.1	145.5	48.0	142.5	144.6	145.5	22.8	144.1	145.5	147.0	1.7	0.58	455	540	510	G		CME
	(Earlier CME to west)				May 24				May 25										
20	Insuff. Data				Insuff. Data				159.1	~160.2	>162.8	1.2	0.74					Data in 16° and 31° photoms. too sparse to classify.	Insuff. data
										Jun. 9									
21	Insuff. Data				Insuff. Data				<171.0	173.0	>175.3	1.0	0.85					Data in 16° and 31° photoms. too sparse to classify.	Insuff. data
										Jun. 22									

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1978 – Orbit No. 6																		
1	Insuff. Data				Insuff. Data				<294.5	~294.5 Oct. 21	~295.5	6.8	0.39					Can't tell 16° and 31°. Too sparse to classify.	Insuff. data
2	304.0	305.0	306.2	572.0	304.0	305.4?	306.2	220.0	305.2	306.0	306.6	31.8	0.29	300?	450?	385	G	Double peaked event at 90°. 16° and 31° data sparse.	CME; Poss. CRS
	(Poss. CRS in sectors 30-2)					Nov. 1				Nov. 2									
3	309.5	311.8 Nov. 7	312.6	625.5	310.0	312.0 Nov. 8	312.6	308.0	310.5	312.4 Nov. 8	313.0	18.7	0.32	1335	690	820	G		CME
4	319.0	319.9 Nov. 15	321.0	210.0	318.7	320.3 Nov. 16	322.2	58.8	320.5 (0.466)	321.7 (22.5)	>323.5 (314.7)	5.5 (285)	0.44						CRS
5	321.2	321.7 Nov. 17	322.3	106.4	321.5	322.1 Nov. 18	322.8	56.0	322.0	322.7 Nov. 18	323.6	6.3	0.46	525	665	610	G		CME
6	331.8	332.6	334.5	80.0	332.3	333.1 334.0 Nov. 30	≥334.0	15.0 10.0	332.5	334.2 Nov. 30	334.8	2.3	0.61	500	475	480	G		CME
	(Earlier Peak is to W. Later peak is to E.)																		
7	329.5	330.8	>331.6	≃40.0	CRS difficult to view from sectors 28–4				<334.8	335.6 Dec. 1	336.8	1.1	0.63					This 90° peak may be assoc. w/ earlier CME.	Poss. CME; Poss. CRS.
	(Poss. CRS)																		
8	<340.1	~341.8 Dec. 7	>342.5	27.0	340.5	342.6 Dec. 8	>343.2	~9.0	342.9	343.5 Dec. 9	>344.2	1.8	0.71						Poss. CRS

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1978 – Orbit No. 6																		
9	342.3	343.5 Dec. 9	344.6	54.0	342.5	344.2 Dec. 10	345.2	~9.0	344.2	345.3 Dec. 11	346.2	2.0	0.73	450	550	510	G		CME
10	345.8	346.5 Dec. 12	347.8	108.0	346.3	347.1 Dec. 13	348.2	27.0	347.1	348.3 Dec. 14	349.5	1.8	0.76	505	555	535	V		CME
11	348.0	348.6 Dec. 14	349.6	70.0	348.5	349.2 Dec. 15	350.6	17.5	349.9	350.4 Dec. 16	351.6	0.8	0.78	585	510	535	G		CME
12	349.5	351.0 Dec. 17	351.8	91.0	350.3	351.6 Dec. 17	352.5	17.5	351.6	352.7 Dec. 18	353.5	0.9	0.80	550	595	580	G		CME
13	359.5	360.3 Dec. 26	361.5	12.5	360.0	360.8 Dec. 26	362.0	2.3	360.5	362.1 Dec. 28	363.3	0.6	0.87	730	560	610	G		CME
	1979 – Orbit No. 7																		
1	96.5 (Can't tell CRS)	97.3	98.3	53.2	96.8 <99.0	97.7 100.2 Apr. 10	99.2 101.8	24.3 18.7	97.7	98.5 Apr. 8	99.3	1.3	0.62	640	620	625	G	Lower photoms. confused with CRS. CRS 90° at 101.8	CME
2	106.0	106.6 Apr. 16	107.5	280.0	106.3	107.1 Apr. 17	108.0	70.0	107.7 105.5 (0.530)	108.4 108.1 (15.9)	109.2 109.5 (141.3)	9.3 8.5 (295)	0.48 0.49	435	295	330	F	Some co-rotation evident.	CME; CRS
3	112.7 114.3	113.5 115.5 Apr. 25	114.3 117.4	166.0 331.9	112.8 ~113.3	113.6 115.1 Apr. 25	114.5 117.3	149.2 90.3	113.0 113.0 (0.441)	114.6 115.0 (25.0)	115.2 116.8 (52.5)	10.5 7.3 (322)	0.40 0.39	1000	355	460	F	Double peaked	CME; CRS

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1979 – Orbit No. 7																		
4	117.0	117.6 Apr. 27	118.3	799.0	117.3	117.9 Apr. 27	118.3	352.0	118.3	118.9 Apr. 28	119.5	8.8	0.34	540	280	335	G	CRS close by.	CME
5	118.7	120.5 Apr. 30		1578.6	120.1	121.7 (Goes east)	>122.9	195.6	120.0 (0.321)	122.5 (15.9)	>123.4 (347.1)	18.3 (258)	0.31						CRS
6	122.5	123.0 May 3	124.0	1757.0	122.7	123.2 (Goes west)	124.3	391.1	123.3	123.7 May 3	124.7	27.4	0.30	835	445	530	G		CME
7	126.4	126.9 May 6	127.9	1612.8	126.8	127.3 May 7	128.3	345.0	127.4	128.4 May 8	129.1	27.0	0.29	310	225	245	G	This and next CME may be one and the same.	CME
8	128.1	128.8 May 8	130.0	2430.3	128.2	129.0 May 9	130.0	701.8	129.0	129.4 May 9	130.0	<40.3	0.30	645	625	630	G	"7 May CME"	CME
9	132.1 129.7	132.8 131.4 May 11	134.2 >133.0	<869.4 845.0	132.4 129.9	133.2 131.4 May 11	134.4 133.0	124.0 165.0	132.9 132.9 (0.343)	134.0 133.9 (22.1)	135.0 134.9 (267.8)	17.0 <12.1 (316)	0.33 0.33	380	340	355	G	Preceding CME to W. CRS to E.	CME; CRS
10	Insuff. Data				138.3	140.5 May 20	144.3	63.0	~139.4	142.3 May 22	145.0	5.9	0.44						Poss. CRS
11	144.7	145.2 May 25	146.0	390.2	144.9	145.5? May 25	146.5	63.5	146.0	146.8 May 26	147.5	3.9	0.50	580?	350?	400	G	This CME may be part of the next CME.	CME
12	145.8	147.3 May 27	149.8	840.4	146.3	147.7 May 27	150.4	144.0	148.0	148.8 May 28	151.0	13.0	0.53	525	435	460	G		CME
13	155.8	156.8 Jun. 5	158.5	211.0	156.0	157.5 Jun. 6	158.7	44.4	157.8	158.8 Jun. 7	159.9	2.2	0.65	355	425	400	G		CME

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1979 – Orbit No. 7																		
14	~158.0	158.5 Jun. 7	159.9	46.9	~158.7	159.4 Jun. 8	161.0	13.3	<160.4 (0.712)	161.0 (18.7)	162.0 (359.5)	1.9 (273)	0.68						CRS
	1979 – Orbit No. 8																		
1	Can't tell; no event visible				Can't tell; no event visible				282.0	283.5 Oct. 10	284.6	1.0	0.62					Maybe a data glitch.	Can't tell.
2	289.1	290.2 Oct. 17	291.5	331.2	Can't tell				290.1	291.2 Oct. 18	292.1	3.3	0.53	–	–	640	G	Earlier CME corotates to 90°(?). 31° photom. loses sensitivity.	CME
	NO 31° PHOTOMETER DATA AFTER THIS TIME																		
3	Insuff. Data								301.3	301.8 Oct. 28	302.9	5.9	0.38					16° data sparse.	Insuff. data
4	302.0	303.1? Oct. 30	304.0	212.9					303.0	303.6 Oct. 30	304.3	13.2	0.36	–	–	875?	F		CME
5	304.4	305.5 Nov. 1	306.0	1720.0					305.5	306.2 Nov. 2	306.8	34.8	0.33	–	–	600	G		CME
6	306.9	307.1 Nov. 3	308.0	1765.0					307.0	307.8 Nov. 3	308.4	17.5	0.31	–	–	550	G		CME
7	308.2	308.8 Nov. 4	309.8	2764.0					309.0	309.5 Nov. 5	310.2	31.9	0.30	–	–	560	G		CME

HELIOS 2 90° PHOTOMETER EVENTS

No.	16° Time(DOY) start	peak	end	ΔI (S10)	31° Time(DOY) start	peak	end	ΔI (S10)	90° Time(DOY) start	peak	end	ΔI (S10)	Dist. (AU)	Speed 16-31	31-90	16-90	Q	Comments	Class
	1979 – Orbit No. 8																		
8	309.7	310.5 Nov. 6	311.5	3516.0					310.8	311.5 Nov. 7	312.2	19.5	0.29	–	–	360	G		CME
9	314.7	316.1 Nov. 12	316.5	3536.0					314.8	315.8 Nov. 11	316.8	5.1	0.30					Strange CME - 16° peak follows 90° peak in 90° photom.	Poss. CME
10	321.2	321.6 Nov. 17	324.0	991.0					322.6	323.4 Nov. 19	325.0	4.7	0.38	–	–	265	G		CME
11	324.5 325.5	325.3 326.5 Nov. 22	327.2 >327.3	442.0 313.0					326.0	326.8 Nov. 22	327.8	4.8	0.42	–	–	365	G	CRS in 16° photom.	CME
12	327.3	328.0 Nov. 24	329.5	901.0					328.3 327.9 (0.456) (See event #11 for CRS)	330.0 328.8 (21.9)	330.5 >329.6 (89.7)	2.0 ~3.1 (222)	0.47 0.45	–	–	305	G	Data glitch after 329.6 in 90° photom. CRS contaminates.	CME; CRS
13	329.3	329.6 Nov. 25	330.3	274.0					330.5	331.2 Nov. 27	331.7	2.8	0.48	–	–	400	G		CME
14	333.0	334.3 Nov. 30	335.4	87.1					332.7	335.2 Dec. 1	335.9	2.0	0.54						Poss. CRS
15	335.7	337.5 Dec. 3	339.4	130.0					337.6 (0.729)	338.7 (38.2)	~340.6 (341.0)	2.5 (326)	0.58						CRS
16	353.8	354.2 Dec. 20	355.3	321.0					354.7	355.4 Dec. 21	355.8	0.8	0.76	–	–	805	G		CME